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TITLE: Liquid biodegradable detergent

PRIORITY-DATA: 1966IT-030280 (November 23, 1966)

PATENT-FAMILY:

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ABSTRACTED-PUB-NO: GB 1190023 A

BASIC-ABSTRACT:

Liquid biodegradable detergent. .B5-. contains (a) up to 50% alkali metal soap (mixture of C14-22 unsat. fatty acid and C8-22 sat. fatty acid) (b) H<sub>2</sub>O and C1-4 alcohol in ratio 1:1-8:1 and (c) up to 15% org. fluidifying agent (glycerol, ethylene glycol, polyethylene glycol, mol.wt. 200-600, and/or K-p-toluenesulphonate).

Preferably up to 36% K<sub>2</sub>CO<sub>3</sub>, Na<sub>2</sub>CO<sub>3</sub>, K or Na tetrabasic pyrophosphate, KCl, NaCl, K<sub>2</sub>SO<sub>4</sub> and/or Na<sub>2</sub>SO<sub>4</sub> is included, also up to 15% emulsifying agent (ethanolamine), and up to 80% K<sub>2</sub>B4O<sub>7</sub>.

ABSTRACTED-PUB-NO: GB 1190023 A

EQUIVALENT-ABSTRACTS:



## PATENT SPECIFICATION

NO DRAWINGS

1,190,023

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Index at acceptance:—C5 D (6A2, 6A5A, 6A5B, 6A5C, 6A5D1, 6A5D2, 6A5E, 6B1, 6B2, 6B3, 6B4, 6B6, 6B7, 6B10C, 6B11A, 6B11C, 6B12B1, 6B12B2, 6B12D, 6B12E, 6B12F1, 6B12G1, 6B12G2A, 6B12G2B, 6B12G5, 6B12G6, 6B12M, 6B12N1, 6B12N2, 6B12N4, 6B12NX, 6B12P, 6C8)

International Classification:—C 11 d 9/02

## COMPLETE SPECIFICATION

## Composition for a Liquid Biodegradable Detergent Product

I, CARLO PELIZZA of Via Aurelia, Nervi (Genova), Italy, of Italian nationality, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a liquid biodegradable detergent composition based on alkali metal fatty acid soap.

According to the invention there is provided a liquid biodegradable detergent composition comprising:

(a) up to 50% by weight of alkali metal soap of at least one fatty acid selected from unsaturated fatty acids having from 14 to 22 carbon atoms and mixtures of at least one such unsaturated fatty acid having from 8 to 22 carbon atoms;

(b) a solvent solution consisting of water and lower saturated monohydric alcohol having from 1 to 4 carbon atoms, the ratio by weight of water to lower saturated monohydric alcohol being from 1:1 to 8:1; and

(c) up to 15% by weight of one or more of the organic fluidifying agents glycerol, ethylene glycol, polyethylene glycol having a molecular weight from 200 to 600 and potassium para toluensulphonate.

In my Patent Application No. 1,172,088 there is described and claimed a liquid detergent composition consisting of:

(a) alkaline soap of fatty acids which are unsaturated fatty acids having from 14 to 22 carbon atoms and mixtures of unsaturated fatty acids with saturated fatty acids having from 8 to 22 carbon atoms and resinic acids;

(b) a solvent solution consisting of water and low saturated monohydric alcohol having from 1 to 4 carbon atoms; and

(c) from 2.5 to 43% by weight of said alka-

line soap of an organic fluidifying agent which is glycerol, ethylene glycol, polyethylene glycol having a molecular weight of from 200 to 600, or mixtures of these.

The liquid detergent composition according to the invention may advantageously include up to 36% by weight of one or more of the inorganic salts potassium carbonate, sodium carbonate, potassium tetrabasic pyrophosphate, sodium tetrabasic pyrophosphate, potassium chloride, sodium chloride, potassium sulphate and sodium sulphate.

The liquid detergent composition according to the invention may also include emulsifying agents, sequestering and/or dispersing agents, optical bleach and perfumes.

Illustrative of the emulsifying agents useful in the liquid detergent compositions of the present invention are the ethanolamines, particularly monoethanolamine. Emulsifying agents may be present in the liquid detergent compositions of the present invention in amounts of up to about 15% by weight although a preferred range is from 3 to 6% by weight.

Emulsifying agents are not essential in the liquid detergent compositions of the invention since the necessary emulsifying power can be obtained by employing a suitably large quantity of the composition in order to exploit the well known emulsifying properties of alkali metal soap.

Illustrative of the sequestering and/or dispersing agents useful in the liquid detergent compositions of this invention are alkali metal sulphocinicates, particularly sodium sulphocinicate, phenol esters condensed with from 7 to 12 moles of ethylene oxide, particularly nonyl and isoctyl phenols, polyethylene glycol mono-oleates with a molecular weight from 200 to 600, preferably 400, higher fatty alcohols with 12 to 18 carbon atoms and con-

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5 densed with from 16 to 25 moles of ethylene oxide, particularly oxyethylated oleic alcohol, sulphonated higher fatty alcohols, particularly sulphonated oleic alcohol, whose sulphonate group may be neutralized with sodium, potassium or ethanolamine, ethylene diamine tetra-acetic acid neutralized with a cation which may be sodium, potassium or ethanolamine, particularly the tetra-potassium salt of ethylene diamine tetra-acetic acid, and alkali metal gluconates, particularly potassium gluconate.

10 In general sequestering and/or dispersing agents may be present in the liquid detergent compositions of the invention in amounts of up to about 25%, particularly 4 to 12% by weight. The inclusion of a sequestering and/or dispersing agent is not essential in the

liquid detergent compositions of the invention when the composition is employed with soft water or when the composition contains various of the inorganic salts disclosed (particularly the phosphates) since these salts have lime soap sequestering and/or dispersing properties.

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The liquid detergent compositions of the invention may also contain potassium tetraborate when it is desired to lower the pH value of the composition. In general, potassium tetraborate may be present in the liquid detergent compositions in amounts of up to about 8%, particularly from about 2.5% to 5%, by weight of the composition.

25

The invention is illustrated by the following Examples.

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#### EXAMPLE 1

A liquid detergent composition was prepared having the following finished product formulation:

|   | % by Weight |
|---|-------------|
| Potassium soap of fatty acids derived from olive oil      | 18.00%      |
| Potassium soap of fatty acids derived from coconut oil    | 18.00%      |
| Water   | 30.74%      |
| Ethyl alcohol   | 10.25%      |
| Tetrapotassium salt of ethylene diamine tetra-acetic acid | 8.00%       |
| Sulphonated oleic alcohol nutralized with KOH             | 3.50%       |
| Monoethanolamine  | 5.00%       |
| Ethylene glycol   | 6.50%       |
| Optical bleach  | 0.05%       |
| Perfume   | 0.05%       |
|   | <hr/> 100%  |

## EXAMPLE 2

A liquid detergent composition was prepared having the following finished product formulation:

|   | % by Weight |
|---|-------------|
| Potassium soap of fatty acids derived from olive oil      | 7.50%       |
| Potassium soap of fatty acids derived from coconut oil    | 7.50%       |
| Water   | 41.20%      |
| Ethyl alcohol   | 13.75%      |
| Potassium salt of the sulphonic ester of castor oil       | 7.00%       |
| Tetrapotassium salt of ethylene diamine tetra-acetic acid | 8.00%       |
| Ethylene glycol   | 10.00%      |
| Polyethylene glycol having a molecular weight of 200      | 5.00%       |
| Optical bleach  | 0.05%       |
|   | <hr/> 100%  |

## EXAMPLE 3

A liquid detergent composition was prepared having the following finished product formulation:

|  | % by Weight |
|--|-------------|
| Potassium soap of fatty acids derived from olive oil   | 10.00%      |
| Potassium soap of fatty acids derived from coconut oil | 10.00%      |
| Water  | 41.20%      |
| Ethyl alcohol  | 13.75%      |
| Ethylene glycol  | 7.00%       |
| Triethanolamine  | 15.00%      |
| Monoethanolamine                                       | 5.00%       |
| Nonyl phenol condensed with 9 moles of ethylene oxide  | 3.00%       |
| Optical bleach   | 0.05%       |
|  | <hr/> 100%  |

## EXAMPLE 4

A liquid detergent composition was prepared having the following finished product formulation:

|   |          |
|---|----------|
| Potassium soap of fatty acids derived from olive oil      | 17.50Kg. |
| Potassium soap of fatty acids derived from coconut oil    | 17.50Kg. |
| Water   | 34.48Kg. |
| Ethyl alcohol   | 4.31Kg.  |
| Potassium tetraborate                                     | 4.00Kg.  |
| Ethylene glycol   | 4.00Kg.  |
| Potassium toluensulphonate                                | 3.00Kg.  |
| Tetrapotassium pyrophosphate                              | 8.00Kg.  |
| Nonyl phenol condensed with 7.5 moles of ethylene oxide   | 4.00Kg.  |
| Tetrapotassium salt of ethylene diamine tetra-acetic acid | 3.00Kg.  |
| Optical bleach  | 0.10Kg.  |
| Perfume   | 0.10Kg.  |

## EXAMPLE 5

5 A liquid detergent composition was prepared as in Example 4 except that part of the potassium tetraborate was replaced with potassium metaborate, part of the ethylene glycol was replaced with glycerol, the tetrapotassium pyrophosphate was replaced with sodium tripolyphosphate, and the nonyl phenol condensed with 7.5 moles of ethylene oxide was

partly replaced with nonyl phenol condensed with 4 moles of propylene oxide and partly with sulphonated oleic alcohol. In this composition the potassium salt of ethylene diamine tetra-acetic acid was also replaced with potassium gluconate. The liquid detergent composition obtained had the following formulation with respect to the quantity of potassium soap present:

|   | % by Weight<br>of Soap |
|---|------------------------|
| Potassium tetraborate                                   | 8%                     |
| Potassium metaborate                                    | 4%                     |
| Glycerol  | 10%                    |
| Ethylene glycol   | 10%                    |
| Sodium tripolyphosphate                                 | 20.0%                  |
| Nonyl phenol condensed with 7.5 moles of ethylene oxide | 4%                     |
| Nonyl phenol condensed with 4 moles of propylene oxide  | 4%                     |
| Sulphonated oleic alcohol neutralized with KOH          | 3.4%                   |
| Potassium gluconate                                     | 8.2%                   |
| Optical bleach  | 0.29%                  |
| Perfume   | 0.29%                  |

5 This liquid detergent composition was a clear biodegradable liquid having a pH of less than 10 and was free from phase separations even when brought to room temperature after having been cooled at very low temperature.

10 EXAMPLE 6  
A liquid detergent composition was prepared as in Example 5 except that one half by weight of the sodium tripolyphosphate was replaced with potassium carbonate.

EXAMPLE 7  
A liquid detergent composition was pre-

pared as in Example 5 except that one half by weight of the sodium tripolyphosphate was replaced with potassium chloride. 15

The detergent composition obtained was a clear liquid free from phase separations and having a pH of less than 10. This detergent composition was shown to have a good detergent action on blood spots. 20

EXAMPLE 8  
A liquid detergent composition was prepared as in Example 5 except that one half by weight of the sodium tripolyphosphate was replaced with potassium sulphate. 25

## EXAMPLE 9

A liquid detergent composition was prepared having the following finished product formulation:

|   | % by Weight |
|---|-------------|
| Potassium soap of fatty acids derived from olive oil      | 9.40%       |
| Potassium soap of fatty acids derived from coconut oil    | 9.40%       |
| Water   | 44.80%      |
| Ethyl alcohol   | 5.60%       |
| Ethylene glycol   | 4.00%       |
| Sodium tripolyphosphate                                   | 8.10%       |
| Potassium carbonate                                       | 9.10%       |
| Potassium tetraborate                                     | 3.10%       |
| Tetrapotassium salt of ethylene diamine tetra-acetic acid | 2.40%       |
| Potassium tetrabasic pyrophosphate                        | 4.00%       |
| Optical bleach  | 0.05%       |
| Perfume   | 0.05%       |
|   | <hr/> 100%  |

## EXAMPLE 10.

A liquid detergent composition was prepared having the following finished product formulation:

|  |           |
|--|-----------|
| Potassium soap of fatty acids derived from olive oil   | 53.50Kg.  |
| Potassium soap of fatty acids derived from coconut oil | 53.50Kg.  |
| Water  | 473.78Kg. |
| Ethyl alcohol  | 59.22Kg.  |
| Sodium tripolyphosphate                                | 26.50Kg.  |
| Potassium chloride                                     | 20.00Kg.  |
| Potassium carbonate                                    | 52.00Kg.  |
| Potassium tetraborate                                  | 40.00Kg.  |
| Potassium sulphate                                     | 10.00Kg.  |
| Potassium gluconate                                    | 16.00Kg.  |
| Tetrapotassium pyrophosphate                           | 193.00Kg. |
| Ethylene glycol  | 53.00Kg.  |
|  | <hr/>     |
|  | 1050Kg.   |

5 The detergent compositions obtained in Examples 9 and 10 were highly liquid and limpid, without phase separations even at a temperature of about 0°C. Both of these compositions had a very modest pH in a 2% solution and a 100% biodegradability rate.

10 It should be noted that the liquid detergent compositions according to the invention may contain up to 50% of inorganic phosphates by weight of alkali metal soap present.

15 In general the 0.5% water diluted detergent compositions according to the invention have a pH less than 10 (measured with a pH-meter) and a biodegradability rate greater than 80%. The liquid detergent compositions of the invention are clear liquids and are not subject to phase separations even when cooled to a temperature less than 0°C and subsequently allowed to reach normal room temperature.

20 It has been found that the liquid detergent compositions of this invention have a high detergent power and this is partly due to the prevailing presence of fatty acid soap with respect to the single percentages of any other organic detergents which may be present, and is also due to synchronism of the constituents

of the liquid detergent compositions which leads to a good synergic effect.

25 It has surprisingly been found that the liquid detergent compositions of this invention produce only moderate quantities of foam despite the fact that no specific anti-foam agent is employed.

30 35 Washing tests performed in domestic washing machines have shown that the liquid detergent compositions according to the invention have a detergent power comparable with that of commercially available detergent products. It has also been found that articles washed in the liquid detergent compositions of the invention have a very favourable degree of softness and are not subject to the degree of wear generally associated with the use of commercially available powder detergents, particularly powder detergents containing chemical bleaches.

40 45 In order to demonstrate this latter point several comparison tests with commercially available powder detergent products have been made so as to determine the rates of deterioration (or wear) of washed fabrics.

50 The method employed in these tests was the

5 Swedish method "SAPPET" (Swedish Association of Pulp and Paper Engineers Technical) for the viscometry of cellulose in Cuen Solvent consisting of ethylene diamine and copper hydroxide.

In these tests standard test pieces of cotton were subjected to 1, 25 and 50 washes in an automatic washing machine at 80°C and then brought into solution in the Cuen Solvent ac-

ording to the "SAPPET" method.

According to this method the viscosity of the solution obtained indicates the degree of polymerisation of the cotton fibres. The rate of wear of the cotton is inversely proportional to the degree of polymerization.

The results obtained based on 10 replicates of the above procedure are set forth below.

|                            | Liquid Detergent of the Invention | Typical Commercially Available Detergent |
|----------------------------|-----------------------------------|--|
| After 1 wash               |                                   |  |
| (Degree of polymerization) | 2110                              | 2090                                     |
| After 25 Washes            | 2110                              | 1750                                     |
| After 50 washes            | 2010                              | 1580                                     |

20 The results of these tests indicate that the liquid detergent compositions of the invention produce very little wear effect on washed fabrics.

#### WHAT WE CLAIM IS:—

25 1. A liquid biodegradable detergent composition comprising:

(a) up to 50% by weight of alkali metal soap of at least one fatty acid selected from unsaturated fatty acids having from 14 to 22 carbon atoms and mixtures of at least one such unsaturated fatty acid with at least one saturated fatty acid having from 8 to 22 carbon atoms;

30 (b) a solvent solution consisting of water and lower saturated monohydric alcohol having from 1 to 4 carbon atoms, the ratio by weight of water to lower saturated monohydric alcohol being from 1:1 to 8:1; and

35 (c) up to 15% by weight of one or more of the organic fluidifying agents glycerol, ethylene glycol, polyethylene glycol having a molecular weight from 200 to 600, and potassium para tolensulphonate.

40 2. A liquid biodegradable detergent composition according to claim 1, including up to 36% by weight of one or more of the inorganic salts potassium carbonate, sodium carbonate, potassium tetrabasic pyrophosphate, sodium tetrabasic pyrophosphate, potassium chloride, sodium chloride, potassium sulphate, and sodium sulphate.

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3. A liquid biodegradable detergent composition according to any one of the preceding claims, further comprising up to 15% by weight of an organic emulsifying agent which is an ethanolamine.

4. A liquid biodegradable detergent composition according to any one of the preceding claims, further comprising up to 25% by weight of an organic sequestering and/or dispersing agent which is alkali metal sulphoricinamate, phenol ester condensed with from 7 to 12 moles of ethylene oxide, polyethylene glycol mono-oletate with a molecular weight from 200 to 600, higher fatty alcohols having from 12 to 18 carbon atoms and condensed with from 16 to 25 moles of ethylene oxide, sulphonated higher fatty alcohols, alkali metal salts of ethylene diamine tetra-acetic acid, potassium gluconate and mixtures thereof.

5. A liquid detergent composition according to any one of the preceding claims, further comprising up to 8% by weight of potassium tetraborate.

6. A liquid detergent composition substantially as herein described and illustrated.

7. A liquid detergent composition substantially as hereinbefore described in any of the foregoing Examples 1 to 10.

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